

WHAT IS CLAIMED IS:

1. An apparatus for obtaining a cuff volumetric pulse wave, comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so that a pressure pulsation is produced in the cuff, and which detects, as an actual cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff;

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between pressure pulsation as input and pressure oscillation as output; and

a cuff volumetric pulse wave determining means for determining, using the inverse transfer function stored by the inverse transfer function memory, a no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor.

2. An apparatus for analyzing a cuff volumetric pulse wave obtained from a living subject, comprising:

the cuff volumetric pulse wave obtaining apparatus according to claim 1; and

a pulse wave analyzing means for analyzing the no-delay cuff volumetric pulse wave obtained by the cuff volumetric pulse wave obtaining apparatus, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.

3. An apparatus for use in a method of obtaining a cuff volumetric pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so that a pressure pulsation is produced in the cuff, and which detects, as an actual cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff;

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between pressure pulsation as input and pressure oscillation as output; and

a cuff volumetric pulse wave determining means for determining, using the inverse transfer function stored by the inverse transfer function memory, a no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor,

wherein the method includes (a) a step of determining the inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, and (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor.

4. An apparatus for use in a method of obtaining a cuff volumetric pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so that a pressure pulsation is produced in the cuff, and which detects, as an actual cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff;

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between pressure pulsation as input and pressure oscillation as output;

a cuff volumetric pulse wave determining means for determining, using the inverse transfer function stored by the inverse transfer function memory, a no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor; and

a pulse wave analyzing means for analyzing the no-delay cuff volumetric pulse wave determined by the cuff volumetric pulse wave determining means,

wherein the method includes (a) a step of determining the inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff

volumetric pulse wave detected by the pressure sensor, and (c) a step of analyzing the determined no-delay cuff volumetric pulse wave, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.

5. The apparatus according to claim 2, wherein the pulse wave analyzing means determines at least one of a maximum magnitude, a minimum magnitude, a rising point, a degree of sharpness %MAP, a maximum slope SLOPE of a rising portion, an area, an augmentation index AI, and a ratio of a maximum magnitude after change of posture of the subject to a maximum magnitude before the change of posture, of a heartbeat-synchronous pulse of the no-delay cuff volumetric pulse wave determined by the cuff volumetric pulse wave determining means.

6. An apparatus for obtaining a pressure pulse wave, comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so as to press an artery of the limb, and which detects, as a cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between intra-arterial pressure as input and pressure oscillation as output; and

a pressure pulse wave determining means for determining, using the inverse transfer function stored by the inverse transfer function memory, a pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor.

7. An apparatus for analyzing a pressure pulse wave obtained from a living subject, comprising:

the pressure pulse wave obtaining apparatus according to claim 6; and

a pulse wave analyzing means for analyzing the pressure pulse wave produced in the artery, and obtained by the pressure pulse wave

obtaining apparatus, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.

8. An apparatus for use in a method of obtaining a pressure pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so as to press an artery of the limb, and which detects, as a cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between intra-artery pressure as input and pressure oscillation as output; and

a pressure pulse wave determining means for determining, using the inverse transfer function stored by the inverse transfer function memory, a pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor,

wherein the method includes (a) a step of determining the inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, and (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor.

9. An apparatus for use in a method of obtaining a pressure pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so as to press an artery of the limb, and which detects, as a cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between intra-arterial pressure as input and pressure oscillation as output;

a pressure pulse wave determining means for determining, using the inverse transfer function stored by the inverse transfer function

memory, a pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor; and

a pulse wave analyzing means for analyzing the pressure pulse wave determined by the pressure pulse wave determining means,

wherein the method includes (a) a step of determining the inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor, and (c) a step of analyzing the determined pressure pulse wave, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.

10. The apparatus according to claim 7, wherein the pulse wave analyzing means determines at least one of a maximum magnitude, a minimum magnitude, a rising point, a degree of sharpness %MAP, a maximum slope SLOPE of a rising portion, an area, an augmentation index AI, and a ratio of a maximum magnitude after change of posture of the subject to a maximum magnitude before the change of posture, of a heartbeat-synchronous pulse of the pressure pulse wave determined by the pressure pulse wave determining means.

11. The apparatus according to claim 4, wherein the pulse wave analyzing means determines at least one of a maximum magnitude, a minimum magnitude, a rising point, a degree of sharpness %MAP, a maximum slope SLOPE of a rising portion, an area, an augmentation index AI, and a ratio of a maximum magnitude after change of posture of the subject to a maximum magnitude before the change of posture, of a heartbeat-synchronous pulse of the no-delay cuff volumetric pulse wave determined by the cuff volumetric pulse wave determining means.

12. The apparatus according to claim 9, wherein the pulse wave analyzing means determines at least one of a maximum

magnitude, a minimum magnitude, a rising point, a degree of sharpness %MAP, a maximum slope SLOPE of a rising portion, an area, an augmentation index AI, and a ratio of a maximum magnitude after change of posture of the subject to a maximum magnitude before the change of posture, of a heartbeat-synchronous pulse of the pressure pulse wave determined by the pressure pulse wave determining means.

13. An apparatus for obtaining a cuff volumetric pulse wave, comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so that a pressure pulsation is produced in the cuff, and which detects, as an actual cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff;

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between pressure pulsation as input and pressure oscillation as output; and

a cuff volumetric pulse wave determining device which determines, using the inverse transfer function stored by the inverse transfer function memory, a no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor.

14. An apparatus for analyzing a cuff volumetric pulse wave obtained from a living subject, comprising:

the cuff volumetric pulse wave obtaining apparatus according to claim 13; and

a pulse wave analyzing device which analyzes the no-delay cuff volumetric pulse wave obtained by the cuff volumetric pulse wave obtaining apparatus, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.

15. An apparatus for use in a method of obtaining a cuff volumetric pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so that a pressure pulsation is produced in

the cuff, and which detects, as an actual cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff;

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between pressure pulsation as input and pressure oscillation as output; and

a cuff volumetric pulse wave determining device which determines, using the inverse transfer function stored by the inverse transfer function memory, a no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor,

wherein the method includes (a) a step of determining the inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, and (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor.

16. An apparatus for use in a method of obtaining a cuff volumetric pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so that a pressure pulsation is produced in the cuff, and which detects, as an actual cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff;

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between pressure pulsation as input and pressure oscillation as output;

a cuff volumetric pulse wave determining device which determines, using the inverse transfer function stored by the inverse transfer function memory, a no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor; and

a pulse wave analyzing device which analyzes the no-delay cuff volumetric pulse wave determined by the cuff volumetric pulse wave determining device,

wherein the method includes (a) a step of determining the

inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the no-delay cuff volumetric pulse wave having substantially no delay of transmission, based on the actual cuff volumetric pulse wave detected by the pressure sensor, and (c) a step of analyzing the determined no-delay cuff volumetric pulse wave, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.

17. An apparatus for obtaining a pressure pulse wave, comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so as to press an artery of the limb, and which detects, as a cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff;

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between intra-arterial pressure as input and pressure oscillation as output; and

a pressure pulse wave determining device which determines, using the inverse transfer function stored by the inverse transfer function memory, a pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor.

18. An apparatus for analyzing a pressure pulse wave obtained from a living subject, comprising:

the pressure pulse wave obtaining apparatus according to claim 17; and

a pulse wave analyzing device which analyzes the pressure pulse wave produced in the artery, and obtained by the pressure pulse wave obtaining apparatus, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.

19. An apparatus for use in a method of obtaining a



pressure pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so as to press an artery of the limb, and which detects, as a cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between intra-artery pressure as input and pressure oscillation as output; and

a pressure pulse wave determining device which determines, using the inverse transfer function stored by the inverse transfer function memory, a pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor,

wherein the method includes (a) a step of determining the inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, and (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor.

20. An apparatus for use in a method of obtaining a pressure pulse wave, the apparatus comprising:

a pressure sensor which is connected to a cuff adapted to be worn on a limb of a living subject so as to press an artery of the limb, and which detects, as a cuff volumetric pulse wave, a pressure oscillation transmitted thereto from the cuff

an inverse transfer function memory which stores an inverse transfer function corresponding to a transfer function between intra-arterial pressure as input and pressure oscillation as output;

a pressure pulse wave determining device which determines, using the inverse transfer function stored by the inverse transfer function memory, a pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor; and

a pulse wave analyzing device which analyzes the pressure pulse wave determined by the pressure pulse wave determining device,

wherein the method includes (a) a step of determining the

inverse transfer function corresponding to the transfer function, and storing the determined inverse transfer function in the inverse transfer function memory, (b) a step of determining, using the inverse transfer function stored by the inverse transfer function memory, the pressure pulse wave produced in the artery, based on the cuff volumetric pulse wave detected by the pressure sensor, and (c) a step of analyzing the determined pressure pulse wave, and thereby determining at least one of a blood pressure, a pulse wave propagation velocity, an arteriosclerosis evaluation index, and an autonomic nerve evaluation value of the subject.